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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/963,499
Filing Date: September 27, 2001
Appellant(s): NISHIMURA, EIICHI

Nick Bromer, Reg. No. 33,478
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 21 February 2006 appealing from the Office action mailed 14 June 2005.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

4,600,815	HORNA	07-1986
6,381,224	LANE et al.	04-2002, filed 03-1999
6,580,795	LI et al.	06-2003, filed 10-1999

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. **Claims 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horna (US Patent 4,600,815) in view of Lane et al. (US Patent 6,381,224).**

Claim 9 is limited to *a method of cancelling an echo of a receive signal in a transmit signal while controlling a signal level of the transmit signal.* Horna discloses an automatic gain control for echo cancellers and similar adaptive systems. See Abstract. The embodiment of interest is depicted in figure 3. Clearly, the echo canceller system disclosed by Horna includes all the typical elements of an echo canceller that removes

an echo of a received signal from a send signal (i.e. *step (d)*). In addition to the typical components, Horna discloses two matched attenuators (32 and 33) that equally amplify the send signal and the echo replica signal before combining them at the summer (12) (i.e. *steps (e) through (g)*). These attenuators share a common control (302), however, Horna does not disclose or suggest how or when to update the amount of attenuation provided by the attenuators, but that the attenuators only attenuate signals of abnormally high amplitude, which is consistent with a typical automatic gain control system. Therefore, Horna anticipates all limitations of the claim with the exception of *detecting activity of the transmit signal and the receive signal, generating signal level data for the transmit signal, and updating the signal level data when the transmit signal is active and the receive signal is inactive*.

Lane teaches a method and apparatus for controlling a full-duplex communications system. See Abstract. The features of Lane depicted in figure 3 represent an acoustic echo canceller with AGC applied to the microphone input, which is similar to the system disclosed by Horna. The main difference between Horna and Lane is that Lane teaches detecting the speech state of both the near and far end signals before applying a type of gain control (i.e. *step (a)*). See column 3, lines 53-57. It is clear that this enables the system to maintain the input signal's dynamic range in various circumstances that require different optimal approaches. For example, during a talk mode (i.e. *transmit signal is active and receive signal is inactive*), a gain factor (G) is updated according to typical AGC methods (i.e. *steps (b) and (c)*). See column 5, lines 21-31.

It would have been obvious to replace the AGC method of Horna with the speech state dependent AGC method as taught by Lane for the purpose of controlling the dynamic range based on the various optimal operating methods required by the different speech states.

Claim 10 is limited to *the method of claim* 9, as covered by Horna in view of Lane. The echo canceller filter (14) is disclosed as being sensitive to double-talk situations, and disables its adaptation in the presence thereof, while allowing adaptation in the presence of far-end speech only (column 2, lines 33-63) (i.e. *updating the coefficients when the transmit signal is inactive and the receive signal is active*). Therefore, Horna in view of Lane makes obvious all limitations of the claim.

Claim 11 is limited to *the method of claim 9*, as covered by Horna in view of Lane. As seen in figure 4 of Lane, the criteria for detecting talk and listen modes includes a comparison with the threshold T_T, (i.e. *a first minimum input level*) and the threshold T_R, (i.e. *a second minimum input level*). Therefore, Horna in view of Lane makes obvious all limitations of the claim.

Claim 12 is limited to *the method of claim 9*, as covered by Horna in view of Lane. As disclosed by Horna, the two attenuators (32 and 33) must have identical gain to stabilize the echo loop (i.e. *wherein said step (f) and said step (g) employ identical gain factors*). See column 4, lines 27-40. Therefore, Horna in view of Lane makes obvious all limitations of the claim.

2. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horna (US Patent 4,600,815) in view of Lane et al. (US Patent 6,381,224) and further in view of Li et al. (US Patent 6,580,795).

Claim 13 is limited to *an echo canceller receiving a transmit signal and a receive signal, the transmit signal including an echo of the receive signal.* In the rejection of claim 11, it was shown that Horna in view of Lane makes obvious detecting activity for AGC devices by comparing the transmit and receive signals to first and second minimum input levels. To accomplish the above, the attenuators (32) and (33) disclosed by Horna were replaced with the talk-mode sensitive AGC devices as taught by Lane, which update their gain in response to the *signal level data* G. Also, it was shown in the rejection of claim 10 that Horna discloses controlling echo canceller filter coefficient updating based on the presence of double-talk. However, claim 10 made no mention of determining activity for the echo canceller using *first* and *second minimum input levels*, and neither Horna nor Lane make disclose, teach or suggest doing so. Therefore, Horna in view of Lane have been shown to make obvious all limitations of the claim with the exception of *updating filter coefficients when the transmit signal is less than a first minimum input level and the receive signal exceeds a second minimum input level.*

Li teaches an echo canceller for a full-duplex communication system and method therefor. See Abstract. The goal of Li is to provide accurate double-talk detection for controlling adaptive filter coefficient updating. See figure 8. To this end, Li employs the same scheme outlined by Lane. See figure 4 of both references. And in addition, Li

teaches an explicit method for determining the talk state, seen in figure 7, which neither Horna nor Lane disclose or teach.

It would have been obvious to one of ordinary skill in the art to employ the method of talk-state detection for the echo canceller as taught by Li (figure 7) simply because neither Horna nor Lane explicitly teach or fairly suggest an accurate method.

Clearly, the similarities of Lane and Li suggest that the teachings of Lane involving adaptive talk-state thresholds would enhance the accuracy of the talk detector of Li. Such that, the first and second minimum input levels used for both control of the echo canceller and the attenuators of Horna are the same.

It would have been obvious to one of ordinary skill in the art to use the same thresholds for talk-state detection as taught by Lane in both the echo canceller and attenuators since the thresholds generated by Lane are adapted for optimal settings in diverse environments. See column 6, lines 8-25, of Lane.

Claim 14 is limited to *an echo canceller receiving a transmit signal and a receive signal, the transmit signal including an echo of the receive signal.* As shown in the rejection of claim 13, Horna in view of Lane and further in view of Li makes obvious an echo cancellation signal generator, a signal level data generator and first and second automatic gain control units that update their respective coefficients, signal level data, and gains based on the transmit and receive signals relation to first and second minimum input levels. Furthermore, as shown in the rejection of claim 9, Horna includes an *arithmetic unit* (12) that *subtracts* the *amplified echo cancellation signal*

from the *amplified transmit signal.* Therefore, Horna in view of Lane and further in view of Li makes obvious all limitations of the claim.

Claim 15 is limited to *the echo canceller of claim 14*, as covered by Horna in view of Lane and further in view of Li. As disclosed by Horna, the gains of attenuators (32) and (33) are equal. See column 4, lines 27-36. Therefore, Horna in view of Lane and further in view of Li makes obvious all limitations of the claim.

(10) Response to Argument

ARGUMENT: OBVIOUSNESS OF CLAIMS 13-15 OVER HORNA, LANE AND LI

On Brief pages 10-12 the appellant summarizes the references. The examiner agrees with the summary of Horna on page 10. The examiner, however, disagrees with the summary of Lane given on page 11, lines 18-27.

In particular, the appellant alleges that the regions of fig. 2 represent specific ranges of a *ratio* of the transmit and receive signals, and not any magnitude of either one. In contrast, the regions of fig. 2 represent specific ranges of a ratio of the transmit and receive signals, such that a given magnitude of E_R defines a specific threshold T_T to be exceeded by E_T. Not only is the TALK region given by a high ratio of transmit to receive signal energy, the TALK region is given by the presence of a minimum amount of transmit energy as defined by the amount of receive energy present (i.e. a phone is in the TALK region when $\mathbf{E_T > T_T * E_R}$, where $\mathbf{T_T * E_R}$ corresponds to a minimum input level). Note, that unless explicitly stated below the inequality $\mathbf{E_R > T_R * E_T}$ is simultaneously determined to establish when a phone is in the LISTEN region.

The examiner also disagrees with the summary of Lane given on page 11, line 29, through page 12, line 2.

In particular, Lane does not use ratios of probabilities, per se, as appellant would lead one to believe. Instead, Lane uses the probabilities to vary thresholds. For example, it was noted above that a phone is in the TALK region when $E_T > T_T * E_R$. In view of figure 4, however, a phone is in the TALK region when $E_T > T_{T'} * E_R$. Note the replacement of T_T with $T_{T'}$. See column 6, lines 7-25, for a description of $T_{T'}$ and $T_{R'}$. This replacement does not change the fact that the energy level E_T is compared to a minimum level that varies in response to the level E_R, a feature not excluded by the claim language.

The remainder of the appellant's summary of Lane appears accurate. Further, appellant's interpretation of Li on page 12, line 16, through page 13, line 5, contains the same inaccuracies treated above regarding Lane. The appellant's discussion of the SILENCE region is moot since it is not germane to the rejections on hand.

Claim 13

(1) *...an echo cancellation signal generator updating filter coefficient when the transmit signal is less than a first minimum input level and the receive signal exceeds a second minimum input level...*

On Brief page 13, lines 11-14, the appellant alleges that Horna discloses never updating filter coefficients. In isolation, the quoted section of Horna does state that coefficients do not need to change, but this does not necessitate that coefficients *never*

update. In fact, doing so would render the adaptive filter 14 utterly useless. Instead, interpreting the quoted section in the entirety of Horna's disclosure suggests that the coefficients of the AFIR do not need to update to compensate for attenuator 32 because attenuators 33 and 34 have the same gain. See column 2, lines 32-63.

On Brief page 13, lines 15-24, the appellant essentially notes that Horna does not teach the claim language noted in bullet (1). While the examiner disagrees with the appellant's logic used in characterizing the disclosure of Horna, there is no disagreement that Horna does not teach the language of bullet (1). However, said language is made obvious in view of the combination of Horna with Lane and Li.

On Brief page 13, line 25, through page 14, line 3, the appellant notes that Lane fails to disclose updating coefficients based on input levels. Again, there is no disagreement that Lane does not teach updating coefficients based on the claimed minimum input levels. However, the examiner disagrees that Lane only discloses ratios and not levels. As shown above, Lane determines when $E_T > T_{T'} * E_R$. Further, the claims make no mention of minima as alleged by the appellant on page 14, lines 1-3.

On Brief page 14, lines 4-17, the appellant makes a somewhat humorous analogy between the prior art and purchasing dogs. However, the appellant has not furthered any argument in this way. The fact remains that Lane determines when E_T exceeds a threshold that varies in response to E_R, and vice versa. It is further noted that Lane discloses using probabilities to determine the threshold slope $T_{T'}$. By probability, $T_{T'}$ is defined to, more-or-less, guarantee that a phone is in the TALK state when E_T exceeds E_R as weighted by $T_{T'}$. See column 6, lines 7-25.

On Brief page 4, lines 18-28, the appellant alleges that one could remove the AGC 53 and 63 of Lane in the LISTEN region. It appears the appellant is suggesting that because the AGC blocks 53 and 63 do not modify the gain of a signal in the LISTEN region, they can be removed. Yet doing so completely invalidates Lane. The appellant is improperly removing an element and its function to show that a reference without said element does not makes obvious the claim language. Clearly such an argument is untenable. It is noted that Li is used to modify the combination of Horna and Lane, resulting in the comparisons $E_T > T_{T'} * E_R$ and $E_R > T_{R'} * E_T$ determining TALK, LISTEN and DOUBLE-TALK states to control both AGC functions and adaptive filter updates. The appellant doesn't even discuss the merits of the above combination.

On Brief page 15, lines 1-12, the appellant alleges differences between the silence region of Li and the claimed invention. These alleged differences are moot, however, as the rejection does not even refer to the silence region of Li.

(2) *...a signal level data generator updating signal level data when the transmit signal exceeds the first minimum input level and the receive signal is less than the second minimum input level...*

On Brief page 15, lines 21-29, the appellant alleges that Lane has nothing analogous to the claimed signal level generator and that there are two AGC's claimed separately where Lane only has one. Column 5, lines 21-31, was noted in the claim rejections. Therein Lane discloses using speakerphone system 50 to calculate gain G using conventional AGC techniques. The invisible means for calculating G corresponds

to the claimed signal level generator. Further, this level G is supplied to both AGC units 53 and 63, which correspond to units 32 and 33 of Horna.

(3) *...a first automatic gain control unit updating a first gain when the signal level data generator updates the signal level data; and a second automatic gain control unit updating a second gain when the signal level data generator updates the signal level data.*

On Brief page 16, lines 3-10, the appellant alleges that Lane uses ratios and not levels, which has been shown above to be a narrow interpretation of Lane. Lane actually teaches comparing E_T to $T_{T'} * E_R$ and comparing E_R to $T_{R'} * E_T$. Further, the fact that Lane might use gains G and G^{-1} is moot, because the gains used by attenuators 32 and 33 of Horna are of interest. In this case, and as noted in the rejections, the gains of attenuators 32 and 33 are the same. Therefore, as all of the appellant's arguments have been shown to be either moot or unpersuasive, the rejection of claim 13 should be affirmed.

Claims 14 and 15

On Brief page 16, lines 19-26, the appellant makes essentially the same arguments treated supra. Again, Lane does indeed teach a comparison to minimum levels defined by $T_{T'} * E_R$ as well as $T_{R'} * E_T$. Also the gains of attenuators 32 and 33 are the same. Therefore, as all of the appellant's arguments have been shown to be either moot or unpersuasive, the rejections of claims 14 and 15 should be affirmed.

ARGUMENT: OBVIOUSNESS OF CLAIMS 9-12 OVER HORNA AND LANE

On Brief page 16, line 29, through page 17, line 4, the appellant alleges the patentability of claims 9-12 for the same reasons as claims 13-15, which have been shown to be either moot or unpersuasive. Therefore, as all of the appellant's arguments have been shown to be either moot or unpersuasive, the rejections of claims 9-12 should be affirmed.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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